soniKKs
ULTRASONICS TECHNOLOGY

User manual
Ultrasonics Generator
soniKKs digital K3DR - W

Device above without – below with Profibus socket

soniKKs GmbH
ULTRASONICS TECHNOLOGY

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Introduction

Dear customer,

we would like to thank you for buying this product. You have purchased a high-quality product, developed based on the latest technology standards, developed and produced exclusively in Germany.

General information

The ultrasonic generator "soniKKs digital K3 DR – W" can be used for ultrasonic plastic- and metal-welding applications as well as for other special applications like sieving, atomizing, etc.

The main features are:

- Auto-tuning circuit to tune automatically to the resonant frequency of the connected horn.
- Fully digital frequency generation.
- High speed microcontroller to control all functions of the generator.
- LCD-display with rotary encoder – or touchscreen-operation (except device in Profibus-version).
- Constant / adjustable amplitude 50 – 100 %
- Protected against
    - Short circuit
    - Idle run
    - Overtemperature
    - Overload

Safety

Below you can see all the warning and security symbols used in this manual.

Symbols in manual:

	Immediate imminent danger – health and life (bad injuries or death)
	Attention hot surface. Do not Touch!
	Possible damage, without danger for people
	Electrical voltage!

Symbols on device:

CE	CE Conformity Symbol

1. Conventional use

The generator was designed to be used for following applications:

- Ultrasonic welding of plastic and metal
- Ultrasonic cutting
- Ultrasonic sieving

This generator can only be used with soniKKs components (i.e. transducers, sonotrodes and other accessories). We cannot guarantee the compatibility and the good functioning of third party manufacturers' components.

For other applications please obtain explicit written approval from the manufacturer!

2. Security instructions

For your own safety, please read this manual carefully before using this product and keep this manual in a place, where it is accessible for all users.

- The electrical connection may only be done by qualified personnel.
- Operations of all ultrasonic equipment by trained staff only!
- Do not use this unit in explosive environments without taking all necessary security measures!
- Check the unit any time before operating.
- The electromagnetic compatibility must be conform to international standards. For more details, consult the "Technical data"-section of this manual.
- All necessary adjustments are either made by the manufacturer or are described in this manual. In case of any trouble with the generator, do contact our technical service.
- Never open the unit or, in any way tamper with it. This will void your warranty and may cause an electric shock.
- All maintenance should be done by trained staff only. For any cleaning or maintenance of the device, do disconnect the mains supply.
- The cable connected to the interface socket must be shielded. Please make sure that this cable is not in close contact to other cables that are conducting high currents. Also avoid close contact of this cable to transformers and relays.
- Please connect the shield to protective earth (GND) only on the generator side.
- All I/O signals have a galvanic contact to the generator.
- Please pay attention at all warnings and hints in this manual and on the generator.
- Do not use the generator in wet and damp environment. Danger of damage on the generator.
- Always place the generator on a stable and flat surface.
- Great attention should be given to the mains supply voltage. Over- or undervoltage can cause malfunctions or destroy the generator!

- Correct operations can only be guaranteed if the generator is used along with the recommended ultrasonic transducers.
- Use only the recommended interface cables. Do not coil up the RF-cable or the line cord. Coiling up these cables can cause overheating of the cables.
- Do not touch the horn/sonotrode while the generator is active. Caution – could be very hot!

ATTENTION!

Continuous operation will lead to hot surfaces of the horn and the sonotrode. They can heat up to 100°C!

- Never point the connected transducer at people.
- If you work with sonotrodes please wear an adequate ear protection or just operate in an acoustic noise protection box.
- Avoid all operation of the generator in presence of animals. They have a more extended frequency range of audible sound than people and are thus highly sensitive to ultrasounds.

In the following cases, immediately disconnect the unit from mains and call a qualified service technician:

- **If cables or connectors are damaged**
- **If the housing is damaged**
- **If fluid came into the generator**
- **If the unit fell to the ground**
- **If the unit shows significant differences from normal operation**

ATTENTION!

Only qualified personnel is allowed to do any modifications on the device.

Device Placement

A running generator can heat up noticeably. If the generator cannot dissipate the heat, there is a possibility of an overheat condition. An error message "Overtemperature" will appear if a display is connected and the "OVERTEMP"-LED will light up. See the error description "Overtemperature" for details.

If possible, avoid operating the unit at ambient temperatures above 30°C/86°F.

Make sure that sufficient cool air can reach the generator for proper cooling. Air conditioning helps in high temperature environment.

Always keep the cooling slots on the rear of the generator clear! Do not place anything in front of the cooling slots.

Keep the generator away from heat sources to avoid overheating. Also avoid direct sunlight exposure.

Place the unit so that no humidity or fluid can come into the generator.

Lay the cables in a way that no one can stand on them or stumble over them.

Never lift the device or carry it by its cables.

ATTENTION!

Place the unit in a way that no vapor (water or other) can get into the device.

Dusty or chemically contaminated air may cause long-term corrosion of the device Avoid heat sources close to the generator to prevent overheating.

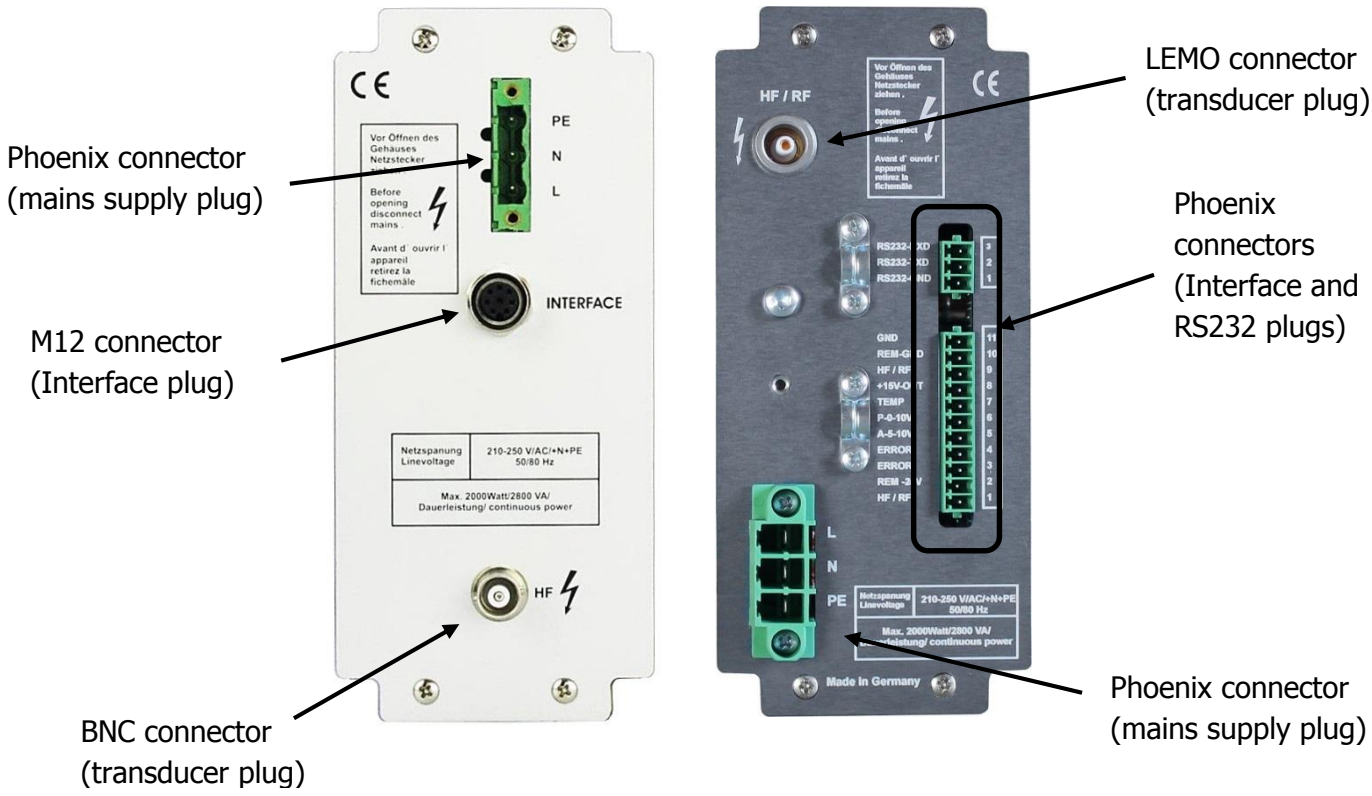
Technical Data

Mechanical Data	
Dimensions (W x H x D)	175 x 70 x 362 mm
Weight	approx. 2,5 kg
Protection category	IP 20 IEC 60 529 EN 60 525

Electrical Data	
Operating frequencies	Depending on generator type 20 - 100 kHz
Mains supply	210 - 250 VAC (L,N,PE) ; 50 - 60Hz
Current consumption	Depending on model - up to maximum 10 A
Ultrasonic power	Maximum 2000 W
Operating temperature range	- 10°C through + 40°C, not condensing
Options	➢ RS232 - socket ➢ Profibus - socket ➢ External graphic display with touchscreen-operation or operation with a rotary encoder

Back panel variants

Our K2 generators are available with different back panels which offer different connectors (see below).



NB: the BNC and LEMO sockets are interchangeable, which means that the right panel is also available with a BNC connector. However, the other connectors (power supply sockets included) cannot be interchanged. In other words, you cannot combine the M12 interface connector with the right Phoenix mains connector for instance.

Connections

Connections of the back panel:

- Mains supply
- Interface connector
- Transducer connector

ATTENTION! When connecting a converter, an additional protective earth connection must be provided. This cable must provide a sufficient cross-section of at least 1,5mm².

1. Electrical connection

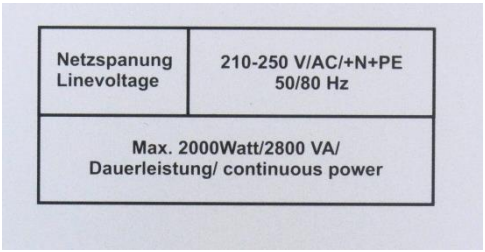
The generator may only be connected to a proper mains supply. The allowed voltage is 230 Volt / AC / 50-0 Hz.

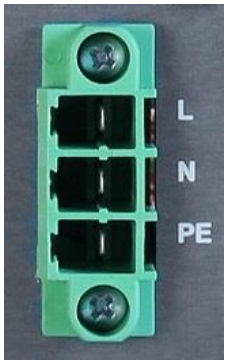
The Mains supply must have a protective earth connection!

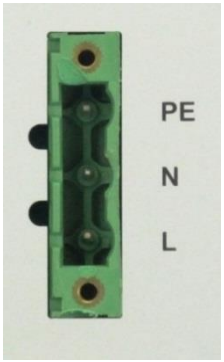
Care must be taken that the supply connection carries neither over- nor undervoltage – this may cause malfunctions or even damage the unit.

Pin assignment of the mains socket (see on the right):

1. PE
2. N
3. L

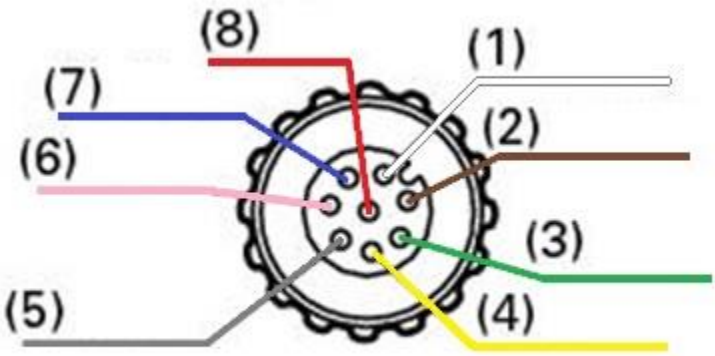






2. M12-type Interface connector

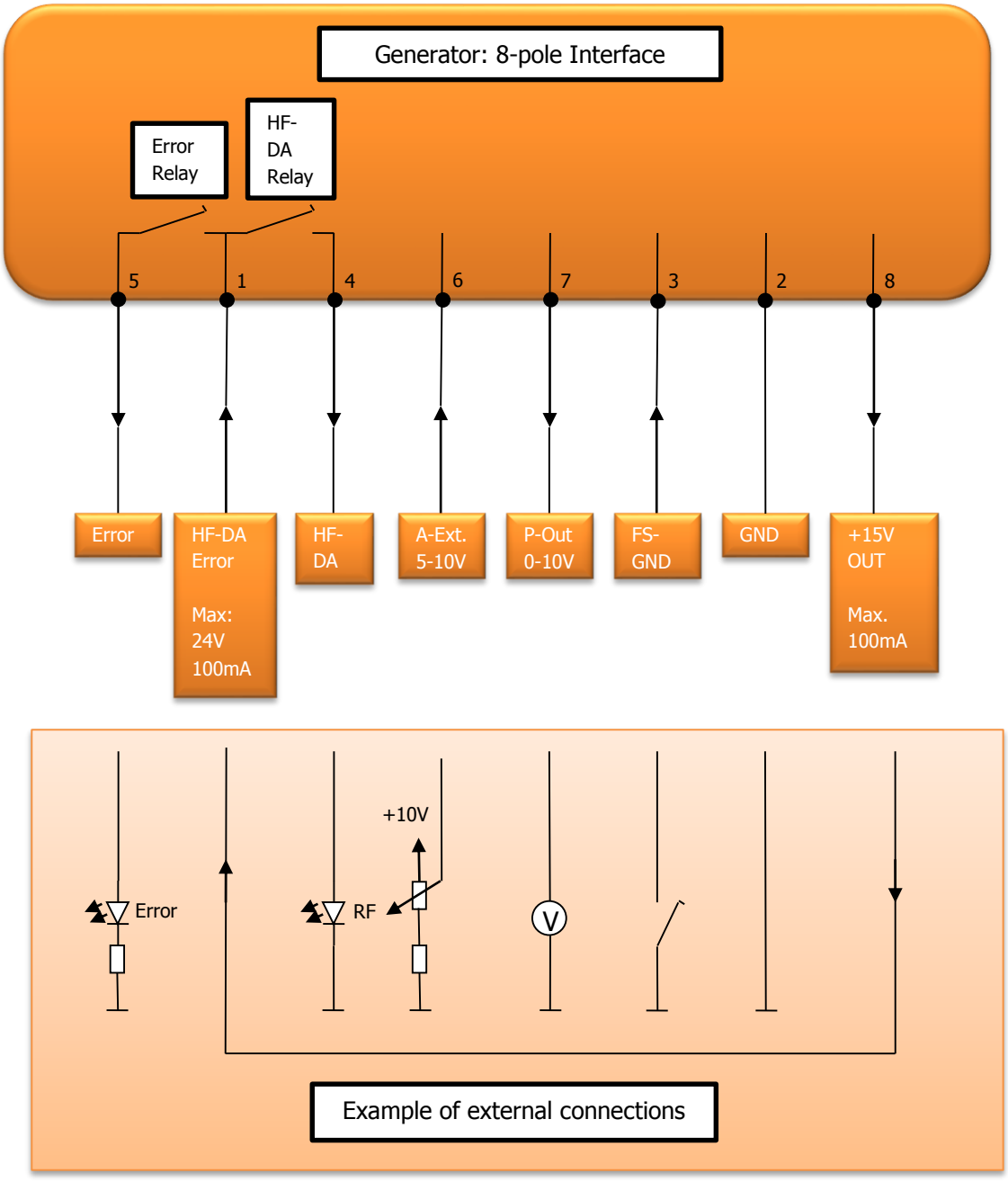
2.1. Pin-out



Pin/ Color	Signal	Description
1 / white	RF-DA & Error	Common relay-root for RF-DA and ERROR relays
2 / brown	GND	Common ground
3 / green	FS- ND	Remote input (active low) – link to ground to turn on the generator Optionally also remote with 24 V is available
4 / yellow	RF-DA relay	Relay output "RF-DA", closed when ultrasonic voltage is emitted - normally open by default
5 / grey	Error relay	Relay output "Error", closes upon error - normally open by default
6 / pink	A-extern	Input 5 – 10 Volt, for external adjustment of amplitude
7 / blue	P-out	Output 0 – 10 Volt, corresponds to the output power 0-100 %
8 / red	+15 V	15 Volt supply voltage for external use (max. 100mA)

ATTENTION! The specified core colors relate to the cables supplied by the device manufacturer. Cables from third party manufacturers might have a different color coding.

2.2. Example of application



2.3. Interface signals description

(1) **RF-DA & Error**

Common input/output root of the internal relays "RF-DA" and "ERROR". Relay input/output signals have no reference to GND.

(2) **GND**

Common reference point for input / output signals (except for the relay outputs).

(3) **FS- GND**

To switch the generator on, connect this signal to GND (pin 2).

(4) **RF- DA relay**

As soon as ultrasonic voltage is available on the RF-output socket, a relay contact closes, and this pin (4) is linked via the relay to Pin 1 (RF-DA & ERROR). Normally open by default (user-configurable). To use this function, connect, for instance 24V to pin 1 (RF-DA & ERROR). This voltage will then appear on this pin 4, as soon as the generator is turned on, and an ultrasonic signal is available on the output socket.

(5) **Error relay**

This pin is internally connected to the error relay contact (root of the relay-contact is pin 1). Normally open by default (user-configurable). If there is any malfunction of the generator, this relay contact will be closed.

(6) **A- extern**

The generator´s amplitude can be controlled with an external voltage applied to this pin. This function can be enabled on the external display. Applying a vo0ltage between 5 and 10V, the amplitude can be adjusted in a range of 50-100% of the nominal generator amplitude. Any voltage below 5V will clip the amplitude to 50%.

(7) **P- Out**

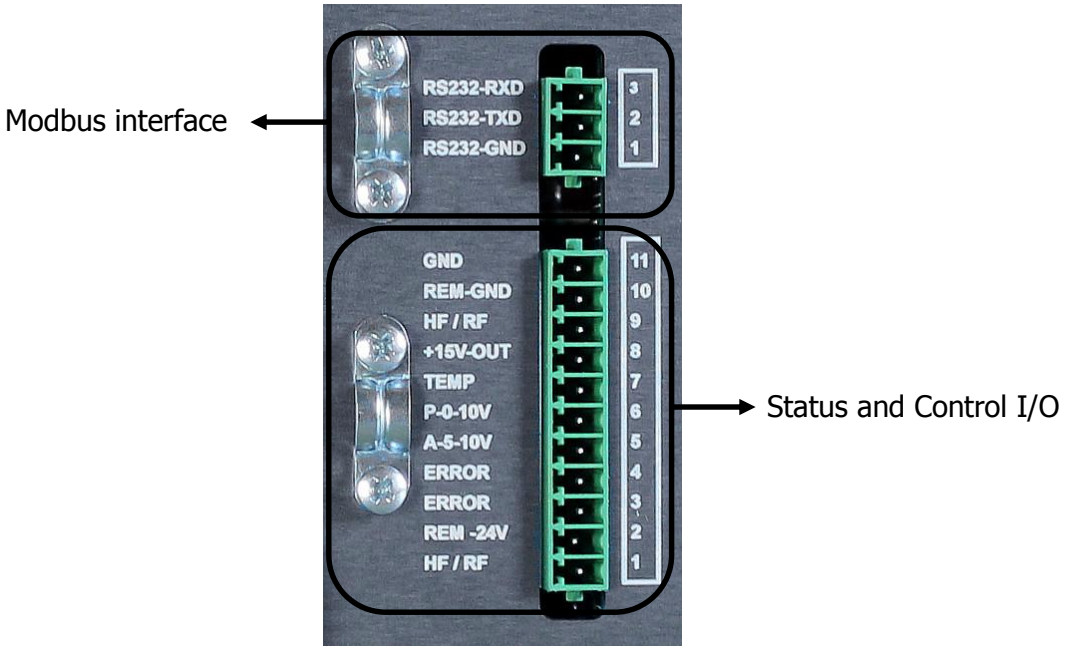
On this pin there is a voltage proportional to the emitted ultrasonic-power in the range of 0-10 volts. This voltage corresponds to the nominal ultrasonic output power. 0V = 0% / 10V = 100%.

(8) **+ 15 V**

This output provides an auxiliary voltage of +15V for external use. The maximum output current is 100mA (75mA permanent load) and can be used as a supply voltage of the relay root "RF-DA &Error" on pin 1.

3. Phoenix-type Interface connector

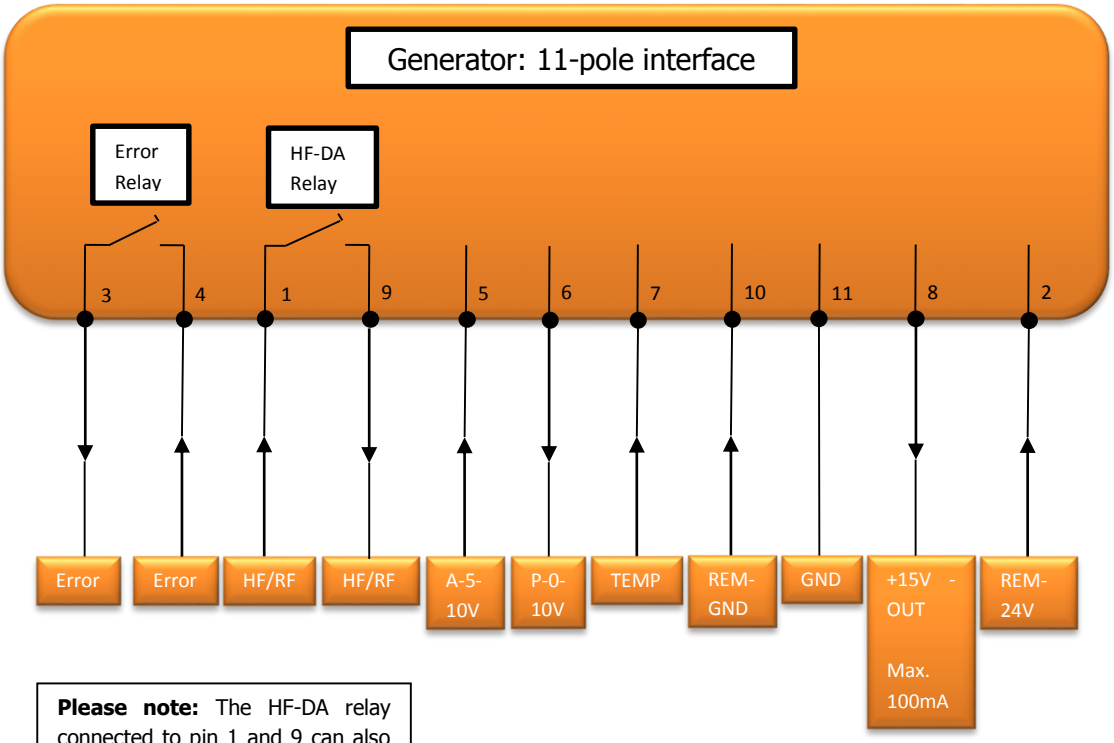
3.1. Pin-out



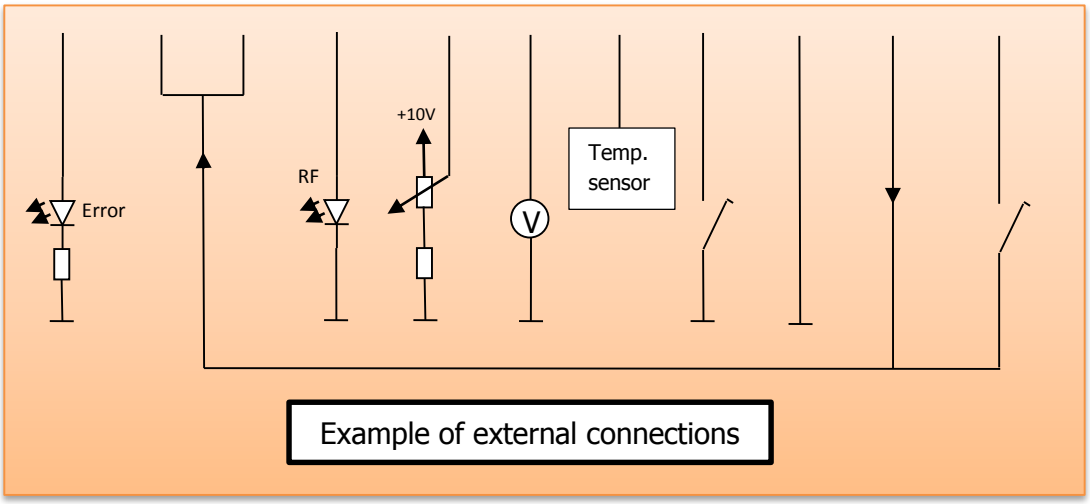
Modbus interface				
Pin Number	**Signal**	**Direction**	**Level**	**Description**
1	RS232-GND	Output	-	Ground reference used for the RS232 bus
2	RS232-TXD	Output	±5V	Modbus transmitting pin
3	RS232-RXD	Input	±5V	Modbus receiving pin

Status and Control I/O				
Pin Number	**Signal**	**Direction**	**Level**	**Description**
1, 9	HF / RF	I/O	Up to 24V	"RF-DA" relay input and output. Relay closed when ultrasonic voltage is emitted. Normally open by default (user-configurable). Relay also works as control relay in cycle welding mode.
2	REM-24V	Input	+24V	Remote input (active high). Reference is GND.
3, 4	ERROR	I/O	Up to 24V	"Error" relay input and output. Normally open by default (user-configurable).
5	A-5-10V	Input	5-10V	Input for amplitude control 5V = 50% amplitude / 10V = 100% amplitude.
6	P-0-10V	Output	0-10V	Output corresponding to the current output power level 0-100%.
7	TEMP	Input	Option	Analog voltage corresponding to the current transducer temperature.
8	+15V-OUT	Output	+15V	15V supply voltage for external use (max. 100mA).
10	REM-GND	Input	Up to 24V	Remote input (active low). Generator ON if connected to GND.
11	GND	Output	-	Common ground.

3.2. Example of application



Please note: The HF-DA relay connected to pin 1 and 9 can also be configured as a driver relay for a pneumatic cylinder. Pls. refer to the manual section "Cycle mode".



4. Profibus-socket (optional)

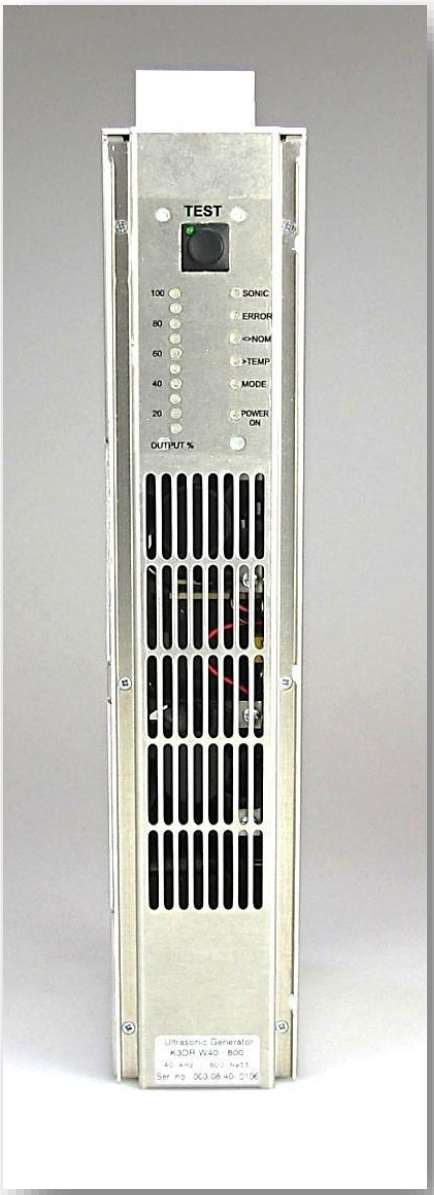
Code – switches to change the Profibus address.	
Code	Hexadecimal
Bus-Adress-L	Low byte
Bus-Adress-H	High byte
Example:	"11" → Address decimal 17 "22" → Address decimal 34

ATTENTION! The bus address **is only checked one time** when the generator is connected to the mains supply.

ATTENTION! Please connect a ground-cable with sufficient cross-section (minimum 6 mm²) to the ground-socket on the front.

Controls and display elements

1. LED – Status indicators



Power	Indicates that the generator is connected to the mains supply and the mains switch is switched on.
Sonic	Indicates that ultrasonic power is emitted.
Error	Indicates that there is a malfunction.
<> Nominal	Indicates that a monitoring function has been set and the requested condition was not met during the last run. Cleared automatically upon next start. Monitoring functions can be set using a LCD-display (extern/integrated).
>temp.	When lit, the generator is overheating and cannot be started. When flashing, the generator was shut down during the last process due to overtemperature. If you start sonic again the LED disappears.
Mode	Indicates that the generator s set to stop after a predetermined condition has been reached. The setting of these conditions can be done with the LCD-display (extern/integrated).
LED – Power gauge	Shows the effective ultrasonic power output in steps of 10 % of the nominal power.

2. Controls and connections

Test – Button	By pressing this button, you can switch on the generator for testing purposes. The button behavior can be configured using the LCD-display (extern/integrated).
Userport	Possibility to connect an external display and also an interface can be connected with a special adapter cable.

Troubleshooting

The "Error" LED comes up right after the generator is started with the test-button or a remote control signal:

Possible reasons

- Malfunction of the ultrasonic converter
- Malfunction of the cable to the transducer (short circuit)

How to fix the problem

1. Disconnect the cable to the transducer
2. Switch on the generator with the test button

Then what?

a. The error still comes up: generator faulty
b. The error does not come up again: transducer or cable faulty

The "Error"-LED comes up with some delay after the generator is started with the test-button or a remote control signal:

Possible reasons

- There is no ultrasonic converter connected
- The tool has a malfunction
- The ultrasonic converter is broken
- Malfunction of the connection cable or plug

How to fix the problem

1. Check the transducer, converter and sonotrode; exchange them if necessary
2. Check cabling and connectors, exchange them if necessary

"Overtemp"-LED lights up or flashes:

If the generator gets overheated during sonification, the "Overtemp." – LED will light up and the generator switches off automatically.

When cooling-down below the trip-point, the generator restarts automatically. The "Overtemp." – LED will flash to signalize this error until the generator is switched off with the test-button or the remote-control.

Possible reasons

- The cooling slots are obstructed
- Device is placed too close to another heat source
- Malfunction in the converter
- Malfunction of the fan

How to fix the problem

1. Check the fan!
2. Check the cooling slots on the backside of the generator.
3. Check device placement, pay attention at the placement advice!

The generator starts and stops on its own:

How to fix the problem

1. Set the "Timer" value to zero
2. Verify that the "MODE"-LED is off
3. Restart the generator

Maintenance and care

There is no need for special maintenance! Please remove any dust and dirt with a damp woven fabric. Do not use any chemicals to clean the generator. Keep the cooling slots clear at all times.

Warranty

The period and extent of the warranty is part of the commercial terms and conditions. Special agreements are part of the confirmation of the order.

The warranty does not cover any malfunctions, injuries and damages that result from such use or improper operation in use.

Warranty exclusion applies in the following cases:

- Damage due to wrong handling or tampering
- Damage due to wrong application
- Damage due to shock, dirt or moisture
- Damage due to operation by nonqualified staff
- Damage due to nonobservance of safety regulations or accident prevention regulations
- Damage due to modifications to the operating manual

Declaration of Conformity

We: soniKKs Ultrasonics Technology GmbH, declare in sole responsibility that the product:

Type: Ultrasonic generator "soniKKs digital K3 DR - W xxxx"
(where "xxxx" indicates the power ratings)

Corresponds to the following EEC directives:
EN 50081-1
EN 50082-2
EN 55022
EN 55014
EN 6055
EN 61000

The requirements of the low voltage directive are observed.

ATTENTION: The device is not designed to be connected to the public utility (AC) power line!

Unauthorized modification of the device makes this declaration void.

Dobel 01.11.2008

Klaus Kern
Managing Director

Imprint

Purpose and use

The operating instructions explain the construction and operation of the ultrasonic generator "soniKKs K3 DR – W" in connection with standard accessories for use in laboratories and the industry.

Please read especially the safety instructions carefully and observe them all time.

The operating instructions should always be at hand, to help you to solve any questions and problems that may arise.

All rights reserved

The manual has been prepared with all due care, nevertheless faults and omissions cannot be fully precluded.

soniKKs GmbH reserves the right to make changes to the technical data and specifications during the curse of further development of the product. Without given prior notice.

Address

soniKKs ® Ultrasonics Technology GmbH
Neuenbürgerstraße 72
75335 Dobel
Germany

Phone: + 49 (0) 7083 – 92 48 360
Fax: + 49 (0) 7083 – 92 48 370
Mail: info@sonikks.de

www.sonikks.de
www.sonikks.com

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